DOCUMENT RESUME

ED 330 640 SP 032 408

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TITLE Nutrient Intake and Dietary Habits of Women Endurance Athletes.
PUB DATE 90
NOTE 16p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Athletes; Body Composition; *Dietetics; *Eating Habits; *Females; Foreign Countries; *Nutrition

ABSTRACT

Dietary information was collected from a sample of women endurance athletes (n=16). Seven-day food intake records were taken using a semiweighted method. Questionnaires were used to obtain additional information on training, supplements, and attitudes toward diet. Notable features of the diets were a low average energy intake while mean intakes of most other macro- and micronutrients were adequate. However, within the group, individuals had low intakes of protein, fibre, iron, zinc, retinal, and some B vitamins. Health conscious attitudes towards diet were exhibited by most of the sample, and six women ate mostly vegetarian diets. Over half the group took supplements including multivitamins, iron, zinc, and calcium. It was observed that energy and protein intakes were lowest among those individuals who do not eat meat. (Author)

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NUTRIENT INTAKE AND DIETARY HABITS OF WOMEN ENDURANCE ATHLETES

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INFORMATION ABOUT SUBJECTS

All sixteen subjects included in this study were women, with an average age of 26 years. Minimum age was 18 years and maximum 43 years.

All were participating in endurance sports daily or six days per week. Sports include: swimming, cycling and running. In practice running and triathlon were the major sports events, all women included some regular running in their training. Sporting interests were mainly recreational although two or three of the subjects competed at a high level in middle distance running events and triathlon.

All women included "harder" and "easier" training days in the week. All but one were employed outside the home in either full or part-time work.

Employment: Nine, full time employed.
One , part-time emplyed.
One, at home with young family
Five, full-time students

It was evident in many cases that fitting in daily training around the needs of the family and work was very difficult, however this only occasionally led to reduced training for any of the women. This indicated a high level of dedication to their sport, despite the fact that most would consider themselves to be "recreational athletes".

METHODS

Subjects were recruited from sports clubs and from amongst the university staff and students. Only women who were known to train regularly (most days every week) were asked to take part in the study.

Infomation on detailed dietary intake and background and training was collected. Dietary information was collected by means of a semi-weighed seven day intake record. Subjects were issued with accurate scales and asked to weigh a list of portion sizes of regularly eaten foods. (Bread, margarine, cereal, milk, meat, potato, vegetable and several more). Subsequently, a detailed diary was kept of all food eaten at home and away from home for the next week. Subjects described portion sizes in relation to their weighed typical portion and in relation other standard sized objects. Where it was occasionally difficult to describe a portion, subjects would often weigh individual foods eg. takeaway meals.

Each record included five weekdays and a weekend as it is recognised that eating patterns may alter considerably at weekends. Subjects were requested to try to choose a fairly typical week, not one in which they were ill or on holiday.

The records were then analysed using a programme based on McCance and Widdowsons Food Table information.

A questionnaire was then completed by each subject including questions on the frequency of training, events entered, current state of fitness, sources of information on diet and health, perceived importance of healthy diet, opinion of food available at training venue (club or leisure centre) and the use of dietary supplements.

All information was collected during July and August 1989. It is notable that unusually hot weather may have influenced dietary intake, many of the subjects felt that they might be eating less, but drinking more than at other times of the year.

TABLE 1

MEAN DAILY INTAKE OF ENERGY, PROTEIN, FIBRE, IRON, ZINC AND CALCIUM

SUBJECT	ENERGY KCAL	PROTEIN G	FIBRE G	IRON MG	ZINC MG	CALCIUM MG
1	1246	55	28	10.1	6.9	607
2	1690	50	26	11.4	6.9	682
3	1094	39	32	9.9	6.5	559
4	2987	76	33	15.1	11.3	1297
5	1529	49	22	10.3	6.8	978
6	1355	67	17	8.4	7.2	678
7	2750	117	41	22.7	15.8	1415
8	2254	64	31	14.3	9.6	1077
9	2385	113	41	16.9	14.7	1286
10	2227	87	56	20.2	12.0	1174
11	2244	91	19	20.4	10.5	1349
12	1845	66	66	20.3	13.2	913
13	2384	69	41	16.3	9.6	1124
14	2602	84	36	15.3	11.1	1113
15	1868	79	40	15.5	10.1	489
16	2827	97	51	17.2	23.4	982
MEAN	**2080**	**75**	**36**	**15.3**	**11.0**	**983**
MIN.	**1094**	**39**	**17**	**8.4**	**6.5**	**489**
MAX.	**2750**	**117**	**66**	**22.7**	**23.4**	**1415**
RDA	**2500**	**62**	**30**	**12.0**	**15.0***	**500**

*US RDA

TABLE 2

MEAN DAILY INTAKE OF VITAMIN A, VITAMIN C, THIAMIN (B1), NIACIN, RIBOFLAVIN (B2), FOLIC ACID, CYANOCOBALAMIN (B12), PYRIDOXINE (B6).

SUBJECT	VIT A UG	VIT C MG	B1 MG	NIACIN MG	B2 MG	FOLATE UG	B6 MG	B12 UG
1	269	171	1.5	22.5	2.0	226	1.3	1.2
2	352	47	1.0	25.5	1.1	160	0.7	1.0
3	348	80	1.0	21.3	1.4	203	1.1	0.4
4	886	37	1.2	23.7	1.3	165	1.1	1.6
5	587	87	0.8	11.9	1.2	189	0.8	1.0
6	512	130	1.1	35.2	1.2	219	1.1	0.9
7	687	272	2.3	71.1	3.1	481	2.3	6.2
8	1111	133	1.1	29.7	1.3	225	1.1	1.3
9	464	182	2.2	56.1	5.6	275	2.2	3.0
10	869	230	1.9	27.9	2.5	407	2.3	6.2
11	1157	50	1.3	16.0	2.8	242	1.3	6.5
12	889	156	2.2	55.3	3.1	357	3.0	5.7
13	660	224	1.4	35.1	2.1	278	2.7	2.7
14	930	105	1.5	44.0	1.8	254	1.5	1.4
15	827	52	1.7	39.3	1.5	231	2.3	4.4
16	633	114	1.8	50.0	1.9	255	1.6	3.6
MEAN	**699**	**129**	**1.5**	**35.3**	**2.1**	**260**	**1.6**	**2.9**
MIN.	**269**	**37**	**0.8**	**11.9**	**1.1**	**160**	**0.7**	**0.4**
MAX.	**1111**	**272**	**2.2**	**56.1**	**5.6**	**481**	**3.0**	**6.2**
RDA	**750**	**30**	**1.0**	**15.0**	**1.3**	**400***	**2.0***	**3.0***

***US RDA**

USE OF DIETARY SUPPLEMENTS

Ten out of the sixteen subjects used some form of dietary supplement (63%). The supplements used included: Vitamin supplements, Mineral supplements (iron or calcium), and mixed mineral and vitamin supplements which were used by six of the sixteen women.

Subjects were asked which of these statements regarding dietary supplements most nearly reflected their attitudes:

(1) I do not take a supplement because all the nutrients I need are provided by the food I eat

(2) I do not take a supplement but I am not sure that my diet does provide everthing that I need

(3) I take a supplement because I feel that my diet may not contain everthing I need

(4) I take a supplement because I am sure that food alone cannot provide all the nutrients needed by active people

The majority of responses fell into the "uncertain" category (2) or (3). Nine subjects agreed with (3), three agreed with (1), three agreed with (2) and one agreed with (4).

Later questioning of the supplement takers revealed that many were rather erratic in taking their minerals and vitamins. For example some only took them if they felt "low", others only at the time of their period.

SOURCES OF NUTRITION INFORMATION

DOCTOR	0
COACH	0
DIETITIAN	8
BOOKS AND MAGAZINES	16
TV AND RADIO	2
FAMILY AND FRIENDS	6
SCHOOL/COLLEGE	4

Books and magazines were mentioned as a source of nutrition information by all subjects, in answer to the question "where do you find most of your infomation on diet and health"

Doctors were not considered a source of dietary information and neither were coaches (however only six had regular contact with a coach). The fact that half the group cited a dietitian as a source of information is likely to be because the subjects had easier access to a dietitian than most sports people.

PERCEIVED IMPORTANCE OF A HEALTHY DIET

The subjects were asked which of these statements most closely reflected their feelings on the importance of diet to sports performance:

(1) Very important, training will not make up for a poor diet
(2) Important, but not so important as good training
(3) Fairly important
(4) Not realy important at all

Ten of the subjects agreed with (2), four with (1) and two with (4). No one felt that diet was not important at all. One quarter felt that diet was very important, perhaps reflecting the growing recognition that good, consistent training cannot be undertaken on an inadequate diet.

FOODS AVOIDED AND SPECIAL DIETS

FRIED AND FATTY FOODS	6
MEAT/RED MEAT	8
CONFECTIONERY	2
LIVER	1
DAIRY PRODUCE	3

The food which was most often avoided by the women was red meat and meat products. Secondly, fatty foods and dairy products were also avoided. Some of the women (4) claimed to follow a vegetarian or semi-vegetarian diet, but not all of those who avoided meat considered themselves to be vegetarian. None of the women claimed to be on a slimming or weight reducing diet.

FOODS PROVIDED AT PLACE OF TRAINING

In half of the subjects place of training no food or drink was provided. Most of these were university running club members. Those who belonged to outside clubs or who trained from a local leisure centre were provided with some food and drink. In four cases this was sweets, crisps and drinks, in four cases it included more substantial snacks such as burgers and sandwiches.

Over half the subjects would have liked to have seen better food provision at their place of training, suggestions for additional choices included:

Fruit, juice, muesli bars, sandwiches and rolls.

In view of the recorded dietary preferences of most of the sample, sweets, crisps and sweet drinks do not seem appropriate foods to offer. This indicates that these foods are perhaps more popular with other sports centre users, such as children and men.

SUMMARY OF FINDINGS

The dietary records revealed the following information. Energy intakes were lower in most cases than the recommended amounts and lower than might be expected amongst such active individuals. In a lot of cases not only were the women training once (sometimes twice) each day but were also very active at other times with physically demanding work.

Low overall energy intakes resulted in low intakes of protein, fibre, iron, zinc, retinol and some of the B vitamins amongst some of the subjects. The mean intake of zinc, folate and vitamin B12 was lower than the recommended amounts. The range of dietary intakes was large, but higher energy intakes were not consumed by the most active. The two highest energy intakes (also high in micronutrients and protein) were consumed by older women with young families who in fact trained less than most of the other women.

Awareness of healthy eating recommendations was very evident from the diets and comments of the women. Cutting down on fat and increasing carbohydrate intake was important to them and the mean percentage of energy supplied by each nutrient was as follows:

FAT	28.4
PROTEIN	15.1
CARBOHYDRATE	54.9
ALCOHOL	1.3

This is in line with the long term recommendations made by the NACNE Report (1983).

However, the necessity to cut out meat completely in order to reduce fat intake is questionable, this may not be a desirable trend in view of the low iron and zinc intake of some of the group. It also appears doubtful if the low fat, high carbohydrate diet taken to an extreme (65 - 70% energy from carbohydrate) can really be adequate in terms of protein intake and intake of certain vitamins and minerals (vitamin A, B group vitamins, iron and zinc).

Very careful choice of food is necessary, and a wide range of foods needs to be eaten to ensure an adequate diet in these conditions.

The avoidance of dairy products in some cases could also be negative in health terms. Although the average intake of Calcium was high, some individuals had quite low intakes. In addition, the recommended amount of calcium in the UK may be low (it is lower than US and New Zealand).

Adequate calcium intakes may be particularly important in young women as this may have some protective effect from osteoporosis in later years. There are a wide range of low fat dairy products which could be used to supply calcium without increasing the fat content of the diet. This may be something which should be given more emphasis in health education.

In general all the women felt that diet was important to their sports performance. The taking of supplements seemed to be somewhat "hit and miss" none seemed really sure why they needed or if they needed them but felt there might be some protective effect. Supplements taken in no way correlated with nutrients which might be lacking or borderline in the diet. More eduction on the use of supplements might also be appropriate.

FIG. 1. TOTAL ENERGY INTAKE, MEAN AND RDA.

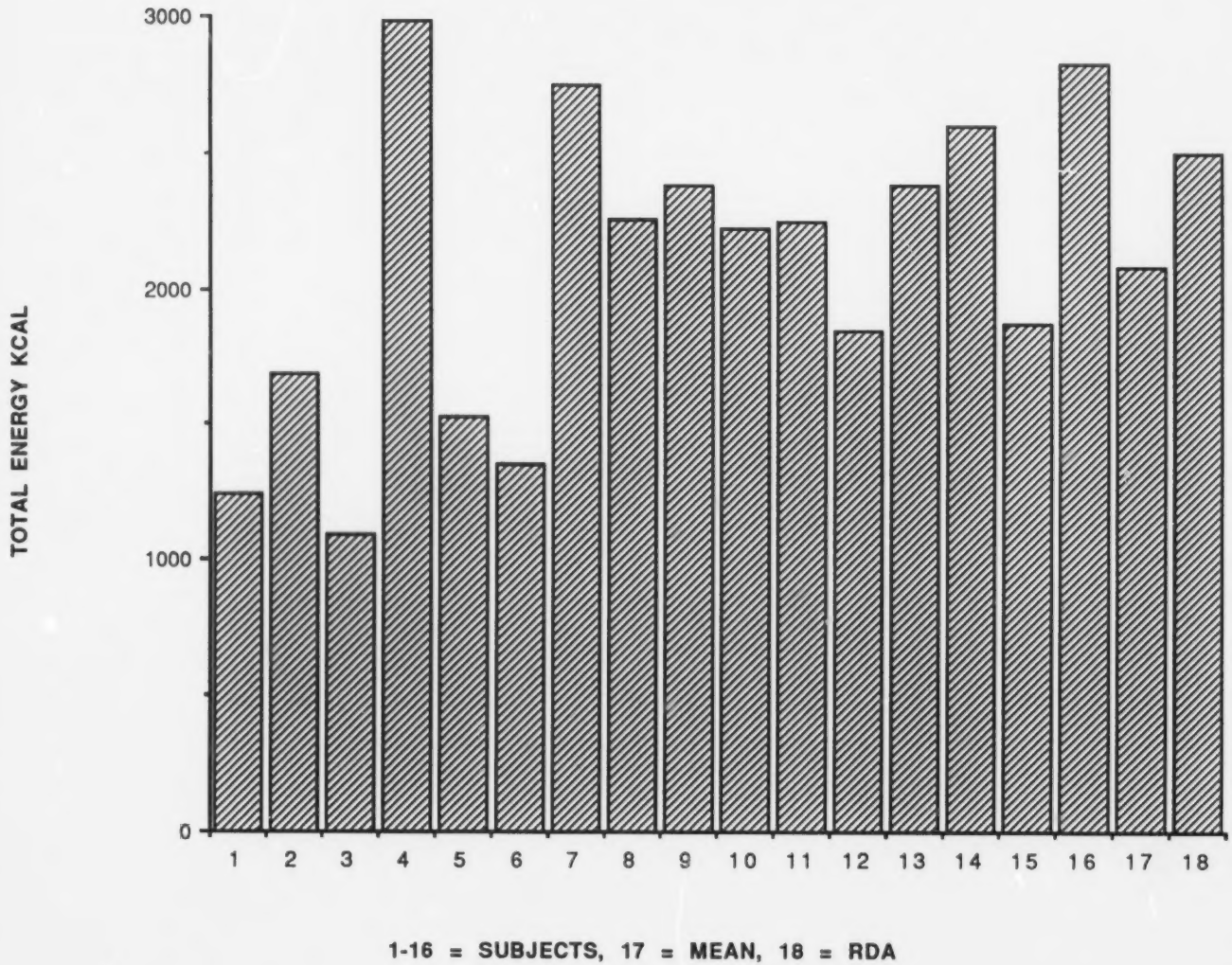
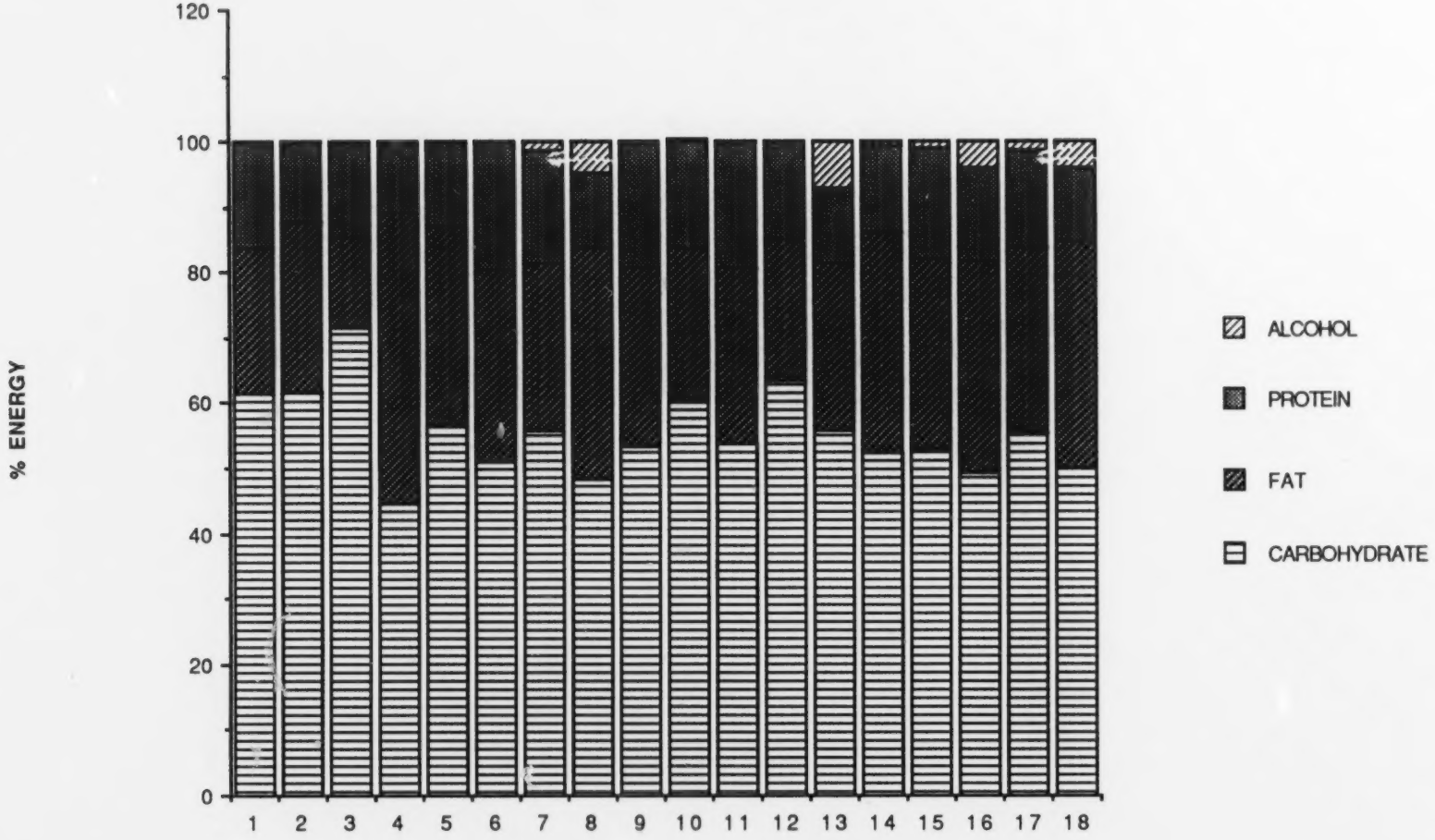


FIG. 2. % ENERGY FROM CARBOHYDRATE, FAT, PROTEIN AND ALCOHOL



1-16 = SUBJECTS, 17 = MEAN,
18 = CURRENT RECOMMENDATIONS